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Translated from the Dutch

Patent Office
The Netherlands

TERINZAGELEGGING * NL 8600728

[*Translator's note: Terinzagelegging is a unexamined application published and laid open to public inspection 18 months after the filing or the priority date.]

Title in Dutch: **Optisch uitleesbare informatieplaat**

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OPTICALLY READABLE DISK FOR THE RECORDING AND STORAGE OF DIGITAL INFORMATION*

[*Translator's note: Also known as compact disk. Source:

http://www.google.com/search?hl=en&q=define%3A+compact+disk&btnG=Google+Search

The invention pertains to an optical read-out disk for the storage and recording of digital information, comprising at least an integral substrate, molded or formed by means of injection molding out of a transparent plastic, which substrate comprises an essentially flat part, which is intended for optical read-out, as well as at least a thickened edge or rim - located next to the flat part - which functions as a spacer rim for a cover plate, attached thereupon at an interval from the flat part.

In the US Pat. No. 4,264, 911 (incorporated herewith by reference), there is described an optical recording disk of the kind, cited above, as well as a method for the injection molding of the substrate. The compact disk (the information disk for the recording and storing digital information)comprises two identical substrates, provided with an central opening. One of the substrates forms a cover plate for the other substrate. Next to the flat part, intended for optical read-out, each substrate - around the central opening as well as on the outer edge - is provided with thickened edges - which are functioning as a spacer rim. The two substrates are attached to one another with the help of the spacer edges or rims. On the exterior, both substrates are completely flat. The information disk for the storage or recording of information ,which can optically be read-out, which disk is formed by attaching to one another the two substrates, possesses thus absolutely flat outer surfaces.

Over the course of the manufacturing by means of injection molding of plastic substrates, there can easily arise problems, due to internal stress in the material. The plastic is pressed in more or less liquid form at a temperature of more than 100 º into the center of the mold cavity of the injection-molding form. Out of it, the molten plastic is distributed in the radial direction onto the periphery or circumference of the mold cavity. The product is obtained by cooling of the molten plastic, as a result of which the plastic again changes over into solid state, whereupon the substrate thus formed is removed out of the mold cavity. With a view to attain thus a rational production, it is desired to reduce as much as possible the time, required for the manufacturing of the substrate. Hence, it is then also desirable to reduce - as much as possible - the time, required for the cooling off of the plastic mass, pressed into the mold cavity. However, the rapid temperature change concurrently brings about the occurrence of thermal stress in the material, and the stress does not have any opportunity to disappear over the course of the rapid solidification. As a consequence of thus, elastic deformations can occur ready-made product, particularly, in the proximity of the outer edge of the substrate. At the place or area, the conditions for elastic deformation are most favorable since the substrate is having minimal rigidity in the said area.

Thus, it will be clear that the problems outlined increase in a continually pronounced way when the diameter of the substrate is larger. However, also in the diameters of the order of magnitude of 13 cm, there are already problems to be expected.

It is an aim of the invention to create an optically readable disk for the storage and recording of information (compact disk) of the kind mentioned in the beginning, whereby a reduced chance is present for elastic deformation of the substrate and, moreover, the compact disk is having yet subsidiary additional advantages and the characteristic feature that the thickened rim essentially possesses a symmetrical mass-distribution with respect to the flat surface, located in the center between the delineating or boundary surface of the flat part, so that a buckling of the substrate as a result of symmetrical internal shrinkage stress is essentially prevented.

As a result of the symmetrical mass-distribution of the thickened edge or of the thickened edges, the locally occurring values of the shrinkage stress mutually neutralize each other at least to a significant extent, as a result of which the chance of a resulting elastic deformation is considerably reduced. Just as in the case of the known optically readable disk for the recording and storage of digital information (compact disk), which was described earlier, optically readable disks for the recording and storage of digital information (compact disks) in accordance with the invention can also be designed out of two identical substrates, attached to one another, provided or not provided with a concentric opening, having a thickened edge around it. The invention is scarcely ever related to the manner of manufacturing of the substrates, since the mold cavity in the injection-molding mold can be embodied in such a way that a symmetrically thickened rim or edge originates without difficulty.

Within the framework of a variant of the optically readable disk for the storage and recording of digital information (compact disk), described earlier, in the compact disk in accordance with the invention, the outer surface is - or the two outer surfaces are - not entirely smooth. The thickened rim projects out though also on the outer side - to seem extent - above or beyond the central flat part. The

presence of a thickened edge on the outer side of an optically readable disk for the storage and recording of digital information (compact disk) does not need to be a disadvantage but can itself be considered as an advantage. The chance of damage of the outer surface of the disk for the storage and recording of information (compact disk) is reduced namely by the projecting edge. If the compact disk is used in combination with an enclosing cassette casing, such as the case is with write-in or recording optical disks for the storage of digital data, protection is then offered by the edge - projecting outwards - against damages of the surface, which could arise as a result of relative movements of the disk for the storage and recording of digital data (compact disk) with regard to the cassette casing.

The invention will now be elucidated in greater detail by means of the drawing, which shows an exemplified embodiment, wherein

Fig. 1 is a view of a disk-shaped optical read-out disk for the storage and recording of digital information, which disk is provided with a central opening,

Fig. 2 is a section along the arrows II - II in Fig. 1 through the center of the disk for the storage and recording of digital information, and

Fig. 3 is a section - on an enlarged scale - of a detail close to the circumference or periphery of the disk for the storage and recording of digital information, as depicted in Figs. 1 and 2, whereby both substrates, out of which the compact disk is formed, are diagrammatically represented art an interval form each other.

The optically readable disk for the storage and recording of digital information (compact disk) possesses -pursuant to the drawing - two substrates 1A and 1B, each one of which is integrally molded by injection-molding out of transparent plastic. They comprise an essentially flat, disk-shaped part 2A, 2B - intended for optical read-out - as well as thickened edges, located nest to it, namely a thickened outer edge 3a, 3B, and a thickened inner edge 4A, 4B. This inner edges are located around the central openings 5A, 5B. One of the substrates forms a cover plate for the other substrate, and the flat parts 2A and 2B are

spaced at an interval from each other as because the edges 3A, 3B and 4A, 4B function as spacer edge or rim.

As can adequately be deduced - first and foremost from Fig 3 - the thickened edges 3A and 3B essentially possess a symmetrical mass-distribution with regard to the flat surfaces, located in the center between the boundary surfaces (interfaces) of the surface (planar) parts 2 A and 2B. The dash-and-dot lines 6A and 6B diagrammatically represent the projection upon the surface of the drawing in front of the said imaginary flat surfaces. The buckling (warping) of the substrates as a result of non-symmetric internal shrinkage stresses near the periphery is essentially prevented by means of the symmetrical mass-distribution. The thickened inner edges 4A and 4B have analogous symmetric mass distribution. After the injection molding, each of the substrates is thus - in the abstract*[*Translator's note: i.e. with reference to theoretical considerations only, apart from practical or actual conditions] - already essentially flat so that when the two substrates are attached to one another, no problems occur, and, also the ultimate product possesses - to a high extent - an elevated chance of flatness or levelness.

In the embodiment form thus shown, the planar parts 2A and 2B are provided on their inner side with a grooved structure 7A, 7B, reproduced over the course of the injection molding of a matrix, which grooved structure is covered by a reflecting layer 8A, 8B. The reflecting grooved structure, which thus originates, is used to facilitate the positional control of an optical system, with whose help - by means of radiation pulses [*sic*] - pinholes can be installed into the reflecting layer, which represent information in digital form.

The two substrates will preferably be attached to each other all the way through in a glass-enclosed or fully glazed manner so that the interstice or intermediate space between the flat parts 2A and 2B is hermetically sealed. For example, the thickened edges or rimmed can be glued to one another. Yet, there are nevertheless other attachment methods, e.g., ultrasonic welding. Reference is made to the European patent application EP 0 094 273 (incorporated herewith for reference) for an example of a disk

for the storage and recording of digital information, which can be read out, which compact disk is manufactured by means of ultrasonic welding. For the ultrasonic welding, it is necessary that one or more projecting parts, such as a narrow, sharply tapered ridge is present on the thickened edges. In the aforementioned European patent application, there is described a disk for the storage and recording of digital information (compact disk) whereby two edental substrates are present, each of which is provided with a pattern of ridges in such a way that these - when looked at in a view upon the compact disk - follow each other alternatingly, and, in doing so, form a pattern, which - for practical considerations - is uninterrupted one. However, it is also possible - in the abstract - to use two different substrates whereby one of them is provided with the said desired projecting parts, while the other one is not.

Although the invention is discussed by means of only a single exemplified embodiment, the invention is not limited thereto. Within the framework of the invention, there are possible embodiment forms of many kinds, thus, e.g., it is possible to cover a substrate of the kind, depicted in the drawing, not with a second identical substrate, but with a flexible disk, or with a profiled cover or lid, consisting or not consisting of a material, which differs from that of the substrate. If that substrate has two vertical edges, such as in the exemplified embodiment, e.g., an outer edge and an inner edge, then it is not necessary to impart to both thickened edges or rims an essentially symmetrical mass-distribution, although the ultimate effect of the invention in such a case will self-evidently be reduced. In the presence of an outer rim or edge, as already exhibited earlier, first and foremost, the symmetrical embodiment of the outer rim is of importance. In addition to one or two thickened edges, more thickened edges can be present - in principle - one, or more of which, possesses/possess a symmetrical mass-distribution in accordance with the invention.

The wording "symmetrical mass-distribution" does not yet mean that the design of the reciprocally situated parts of the aforementioned flat plane should also be exactly the same in all respects. Thus, e.g., on one of the sides of a thickened edge, there can be present means for the attachment of a

cover plate or a second substrate, e.g., means for tlhe ultrasonic welding, while on the other side of the thickened edge, there are not such means.

PATENT CLAIM

1.Optical read-out disk for the storage and recording of digital information, comprising at least an integral substrate, formed by means of injection molding out of a transparent plastic, which substrate comprises an essentially flat part, intended for optical read-out, as well as at least a thickened edge or rim - located next to the flat part - which functions as a spacer rim for a cover plate, attached thereupon at an interval from the flat part, characterized in that the thickened edge or rim essentially possess a symmetrical

mass-distribution with respect to the flat surface, situated in the center between the boundary or delineating surfaces of the flat part, so that a buckling (warping) of the substrate, due to asymmetrical internal shrinkage stress, is essentially prevented.

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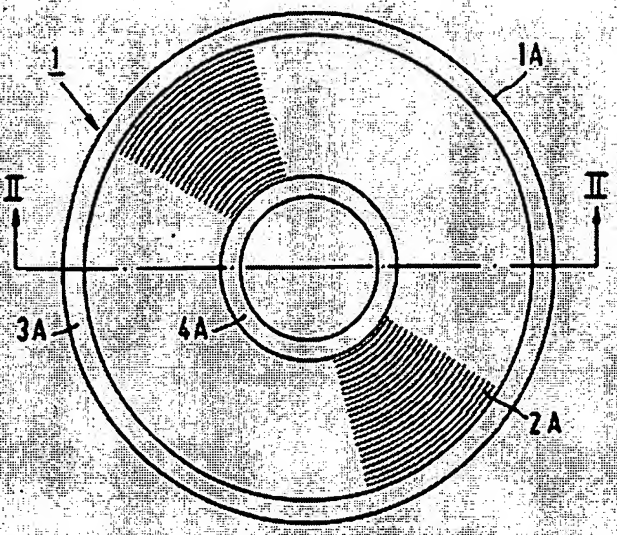

FIG.1

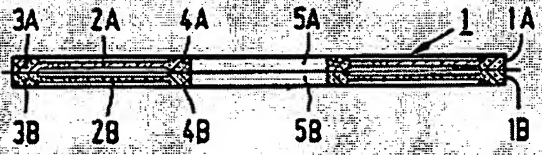

FIG.2

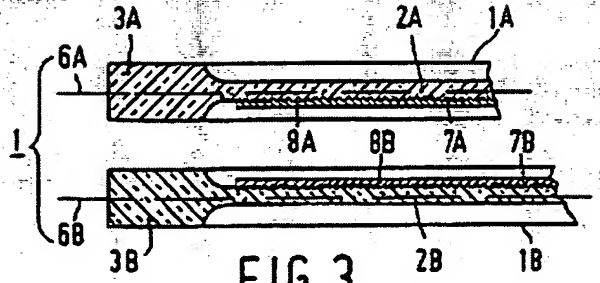

FIG.3